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ABSTRACT

A major concern in recent research is whether perceptual or functional information is of primary importance in children's early word meanings. In the study described here, artificial objects were used so that form and function could be independently manipulated. There were 57 subjects, ranging in age from 2.5 years to adulthood. The subjects were shown a "jiggy," a box with a face on it and a lever which manipulated the eyes and nose. They were shown a "zimbo," a gumball machine that projected jelly beans. The third object they were shown was a combination of the two, a box that looked like a "jiggy," but that functioned like a "zimbo." When asked what to name the hybrid machine, younger and older children responded on the basis of form; children of middle years responded on the basis of function. The children who named the hybrid object on the basis of its form had learned the name of the "zimbo" faster, and they liked that machine better. However, it appears that the content of the word meaning, and the basis for applying the word to new instances, is initially perceptual information. It seems, therefore, that children implicitly based their word meanings on well-understood conceptual structures and that knowledge of form is the conceptual system that children understand earliest and therefore rely on in their early word meanings. (AMH)

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Papers and Reports on Child Language Development, Number 15

WHAT LOOKS LIKE A JIGGY BUT ACTS LIKE A ZIMBO?: A STUDY OF EARLY WORD MEANING USING ARTIFICIAL OBJECTS

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This paper is concerned with the question of what information enters into children's early word meanings. When a child first learns that a word refers to an object, what does the child store as the word's meaning? When the child later applies the word to the same or other objects, on what basis is (s)he doing so?

A major concern in recent research in acquisition of meaning is whether perceptual information or functional information is of primary importance in children's early word meanings. In E. Clark's semantic feature theory, she proposed that children base their first word meanings on perceptual information associated with the referrent. Her review of parental diaries of children's first word usages showed that a large number of early noun over-extensions were based on similarity of form between the original referent and the new object to which the word was incorrectly applied (Clark, 1973). Clark's position is supported by the reports of Anglin (1977) and Bowerman (1974, 1975) and others, who have found large numbers of perceptually-based overgeneralizations. Nelson (1973) has put forth an opposing view that children's initial word meanings are predominantly based on dynamic and functional information, rather than on perceptual information. She points out that children are primarily interested in actions and functional relationships. Questions like "What does it do?" or "What is it for?" are more important to young children than "What does it look like?". Therefore children are more likely to include in their initial word meanings information about the actions and relationships an object engages in, particularly those that affect the child, than information that merely derives from the perceptual form of the object. Nelson's (1973) examination of early vocabularies showed that children learn first the names of objects that they can operate on and that change and move.

Both theories hold that an object's normal motion is likely to be included in its early meaning. The two positions differ as to the relative importance of static form and of the use to which an object is put. The Clark theory states that form should predominate over use in early word meaning; the Nelson theory, that use should predominate over form. It is difficult to test between

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these two positions, since form and function are mutually constraining and are therefore highly correlated among real objects (Anglin, 1977). Objects that float on water generally look a lot like boats; objects that move fast are streamlined, and so on. This correlation makes it hard to resolve the controversy unambiguously. A further reason that it has been difficult to test between the two positions is that Nelson's position has an additional complexity. Nelson states that, while the basis for children's word meanings is functional information, children rapidly learn that perceptual information is correlated with this functional core. Once they learn about this correlation, they may rely on perceptual information rather than functional information in their use of object names. The naming behavior of children whose core meanings were functional but who used perceptual information when applying words would of course be indistinguishable from the behavior of children whose meanings were perceptual. Thus the Nelson theory yields predictions similar to those of the Clark theory in most cases.

There is, however, one case in which the predictions of the two theories are different. This is the case in which perceptual information and functional information are not correlated. In such a case, Nelson's theory predicts that a child should attend to the functional aspects of the object in deriving its meaning; Clark's theory predicts that the perceptual aspects of the object will be used.

In the study described here, I used artificial objects so that form and function could be independently manipulated. I chose objects and functions that I thought would seem natural and interesting to children. There were two original objects that differed both in form and function, and a hybrid test object. Figure 1 shows the objects. The jiggy was a blue and yellow square box, on the side of which was mounted a bright orange face. There was a lever on the side of the box, connected to the face in such a way that when the child moved the lever back and forth the eyes and nose moved up and down, changing the expression on the face.

There were 57 subjects, ranging in age from 2 1/2 years to adulthood. The experiment was conducted in a naturalistic manner. Children encountered the jiggy in a waiting room where other children and adults were playing and talking. We would say to the children as they entered the waiting room, "Oh, have you seen the jiggy yet? Here it is. Would you like to make it work?" We would ask other children to show the jiggy to the newcomer. Whenever we passed through the room, we made a practice of saying to one or another of the children something like, "Can you remember what this is called?" Or "How do you make this work?". In this way, we tried to be sure that all the children were very familiar with both the name and the function of the jiggy, and that they regarded it as a natural toy, and not some strange experi-

Figure 1. The objects used.

mental device.

The zimbo, also shown in Figure 1, was a gumball machine. It had a red base and a clear plastic sphere containing jellybeans. It had a lever similar to that of the jiggy. When the lever was moved back and forth, two or three jellybeans poured from the machine. Thus, the jiggy and zimbo differed from one another in both form and function. As with the jiggy, we tried to be sure that children perceived the zimbo as a natural object. The children encountered the zimbo in a second room, while participating in an unrelated experiment. The children, particularly the younger ones, were quite pleased with the zimbo, learned its name very rapidly, and asked to play with it again and again, each time consuming another few jellybeans.

When the child had learned the name zimbo thoroughly and knew how to operate the machine, the child and the experimenter went back to the waiting room and revisited the jiggy. The child was questioned to be sure that (s)he could still remember what the jiggy was called and how it was operated. Then we took the child into a third room and unveiled the hybrid object. This object looked almost precisely like the jiggy he had just seen in the waiting room. We asked the child, "Can you make this work?" The child invariably stepped confidently forward and moved the handle in the accustomed way. When instead of changing facial expressions, the machine produced a flood of jellybeans, the children were astonished. Their

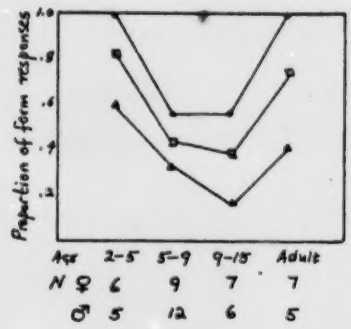

Figure 2. Proportion of responses based on form (jiggy responses).

reactions ranged from excited laughter to startled exclamations. When they had calmed down, we asked them what the object should be called. Very young children usually responded fairly readily with either the name jiggy or zimbo. Older children and adults sometimes responded with a combination name, such as jiggy-zimbo. In this case, we asked them, "If it had to be either a jiggy or a zimbo, which would it be?" The results are shown in Figure 2.

The pattern of results is rather surprising. Younger and older children responded chiefly on the basis of form, while children of middle years responded chiefly on the basis of function. The age differences just reached significance ($\chi^2 = 7.823$; $p < .05$). This curvilinear pattern raises some interesting possibilities, discussed later in this paper. However, one thing that is clear is that the youngest children--aged 2 1/2 to 5 years--are responding on the basis of form and not function. For these children, when form and function are put into conflict, it is form rather than function that determines the application of the word in this new situation. The fact that the younger children showed this pattern to a greater extent than the older children seems to be counter evidence to the Nelson position. It might be argued, in support of the Nelson theory, that these children have already learned the correspondence between form and function and can now apply it in new situations when storing initial word meanings; and that at an earlier time these children would have applied the words on the basis of function and not form.

The developmental pattern would then be N-shaped, not U-shaped: there would be the prediction that, with still younger children, functional responses would have outweighed form responses. This possibility seems cumbersome and would require considerable defending.

The fact that the young children based their responses on form is not an indication that they found the functional aspects of the situation uninteresting. On the contrary, the children's reactions left no doubt that the functions of the objects, especially that of the zimbo, were important to them. Almost all the children, particularly the younger ones, asked to play with the zimbo again and again. We observed also that they learned the name of the zimbo considerably faster than the name of the jiggy. (No formal records were kept of the speed of acquisition; but the informal observations of the three experimenters were in agreement on this point.)

Young children learned the name of the jellybean providing zimbo more rapidly than the name of the less functionally-interesting jiggy. Yet, when they had to apply a name to the hybrid object, they called it a jiggy because of its shared form, in spite of the fact that its function was that of the more relevant zimbo. This pattern suggests that we need to distinguish more carefully between which objects children find interesting enough to want to name and what information about these objects enters into their word meanings. The results of this study are in accord with Nelson's (1973) findings that children learn first the names of objects whose functions are important to them. However, it appears that the content of the word meaning (and the basis for applying the word to new instances) is initially perceptual information.

It is perhaps surprising that children fail to base their word meanings on the aspects of the objects that interest them most. I believe that the reason is that children implicitly base their word meanings on well-understood conceptual structures (H. Clark, 1973; Huttenlocher, 1974; Nelson, 1974). It seems likely that static perceptual knowledge (that is, knowledge of form) is the conceptual system that children understand earliest, and therefore rely on in their early word meanings (H. Clark, 1973).

If this is true, it raises some interesting speculations concerning the U-shaped developmental pattern found here. It is tempting to consider that this trend represents children's growing understanding of the importance of function. It is possible that at an early age, children think of objects in a simple visual way, even mechanical objects, since they lack any systematic understanding of the kinds of mechanical functions that objects can perform. At a later age, when children begin to understand mechanical information in a coherent way, they are ready to include this information in their word meanings. They may even become enamored of this new kind of understanding and use it to a far greater extent than an adult would do. (Such over-uses of conceptual generalizations are, of course, common in language development.) This speculation receives some support from the fact that girls showed much less reliance on functional information throughout than boys ($\chi^2 = 7.77$; $p \leq .01$). Assuming that the girls in this study had less experience with mechanical devices than the boys, they would not have developed as well-elaborated a conceptual system as the boys did, and would have continued to rely primarily on perceptual information.

References

Anglin, J.M. Word, object and conceptual development. New York: W.W. Norton & Co., 1977.

Bowerman, M. The acquisition of word meaning: An investigation of some current conflicts. Paper presented at the Third International Child Language Symposium, London, September, 1975.

Bowerman, M. Semantic factors in the acquisition of rule for word use and sentence construction. In D. Morehead & A. Morehead (Eds.) Directions in normal and deficient child language. Baltimore: University Park Press, 1976.

Clark, E.V. What's in a word: On the child's acquisition of semantics in his first language. In T.E. Moore (Ed.) Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Clark, H.H. Space, time, semantic and the child. In T.E. Moore (Ed.) Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Huttenlocher, J. The origins of language comprehension. In R.L. Solso (Ed.), Theories in cognitive psychology: The Loyola Symposium. Potomac, Md.: Lawrence Erlbaum Associates, 1974.

Nelson, K. Structure and strategy in learning to talk. Monographs of the Society for Research in Child Development, 1973, 38, 149.

Nelson, K. Concept, word and sentence: Interrelations in acquisition and development. Psychological Review, 1974, 81, 267-285.